First light from the Felsenkeller 5 MV underground accelerator

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Abstract

The study of astrophysically important nuclear reactions between stable ions requires the use of low-background, underground accelerator laboratories. The Felsenkeller underground site in Dresden, shielded by a 45 m thick rock cover, hosts a 5 MV Pelletron ion accelerator with an external sputter ion source (for ^{12}C and other beams) and an internal radio-frequency ion source (for noble-gas and hydrogen beams). The remaining no-beam background in muons, neutrons, and γ-rays at Felsenkeller has been completely characterized. The measured γ-background is sufficiently low to enter the Gamow peak for the so-called Holy Grail reaction $^{12}\mathrm{C}(\alpha,\gamma)^{16}\mathrm{O}$. The accelerator has recently been commissioned at the underground site and will soon offer a significant amount of beam time for external users, free of charge. The contribution will report on status and characteristics of the new accelerator lab, as well as on the envisaged scientific program.